## CLAIMS

What is claimed is:

1. An object inspection method comprising:

offline modeling of an object type; and

runtime matching of an object corresponding to the object type.

2. A method as defined in Claim 1 wherein said object is a miniature surface mount component.

3. A method as defined in Claim 1 wherein offline modeling comprises:

receiving reference data for objects corresponding to the object type; and

providing a model for the object type in correspondence with the received reference data.

4. A method as defined in Claim 3 wherein the received reference data comprises computer aided design parameters for objects corresponding to the object type.

5. A method as defined in Claim 3 wherein the provided model comprises a polygonal shape.

6. A method as defined in Claim 1 wherein runtime matching comprises:

receiving an image having an object of the object type;

performing a coarse search for the object; and

performing a refined search for the object.

7. A method as defined in Claim 6 wherein the received image comprises an object located on a simple image background.

8. A method as defined in Claim 6 wherein performing a coarse search comprises localizing the object from the image in accordance with a model, and wherein performing a refined search comprises measuring the localized object.

9. A method as defined in Claim 8 wherein localizing comprises estimating the pose of the object, and wherein measuring comprises estimating the dimension of the object.

10. A method as defined in Claim 8 wherein localizing comprises:

iteratively segmenting the object; and

applying a moment transformation to the segmented object.

11. A method as defined in Claim 10 wherein iteratively segmenting the object comprises:

selecting an initial estimate of a threshold by using the average gray-level of the 2n brightest pixels in the image, where n is the size of the model;

segmenting the image into a background region and an object region in accordance with the threshold, with the pixels having a gray-level less than the threshold being assigned to the background region and all other pixels being assigned to the object region;

calculating the mean gray-levels within the background and object regions, respectively;

calculating a new threshold in accordance with the calculated mean gray-levels and the number of pixels in each region;

repeating the above steps of segmenting, calculating gray-levels and calculating new thresholds until convergence is reached; and

obtaining the segmented object from the final pixels in the object region.

12. A method as defined in Claim 8 wherein measuring comprises:

detecting and interpolating edges of the object; and

iteratively optimizing measurement results.

13. An object inspection system comprising:

means for modeling an object type; and

means for matching an object corresponding to the object type.

14. A system as defined in Claim 13 wherein said object is a miniature surface mount component.

15. A system as defined in Claim 13 wherein the means for modeling comprises:

means for receiving reference data for objects corresponding to the object type; and

means for providing a model for the object type in correspondence with the received reference data;

16. A system as defined in Claim 13 wherein the means for matching comprises:

means for receiving an image having an object of the object type;

means for performing a coarse search for the object; and

means for performing a refined search for the object.

17. A system as defined in Claim 16 wherein the means for performing a coarse search comprises means for localizing the object from the image in accordance with the model, and wherein the means for performing a refined search comprises means for measuring the localized object.

18. A system as defined in Claim 17 wherein the means for localizing comprises means for estimating the pose of the object, and wherein

the means for measuring comprises means for estimating the dimension of the object.

19. A system as defined in Claim 17 wherein the means for localizing comprises:

means for iteratively segmenting the object; and

means for applying a moment transformation to the segmented object.

20. A system as defined in Claim 17 wherein the means for measuring comprises:

means for detecting and interpolating edges of the object; and

means for iteratively optimizing measurement results.

21. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for automatically detecting nodules from image data, the method steps comprising:

receiving an image having an object corresponding to an object type;

iteratively segmenting the object;

applying a moment transformation to the segmented object;

detecting and interpolating edges of the object; and

iteratively optimizing measurement results.

22. An object inspection system comprising:

an object modeler;

an iterative object segmentor in signal communication with the object modeler;

a moment transformer in signal communication with the iterative object segmentor;

an edge detector and interpolator in signal communication with the moment transformer; and

an iterative optimizer in signal communication with the edge detector and interpolator.

23. An object inspection system as defined in Claim 22 wherein the iterative object segmentor is for receiving an input image and model parameters and producing a segmented image, the iterative object segmentor comprising:

a threshold computer;

an image binarizer in signal communication with the threshold computer;

a threshold updater in signal communication with the image binarizer; and

a threshold convergence checker in signal communication with the threshold updater.

24. An object inspection system as defined in Claim 22 wherein the moment transformer is for receiving an input image, model

parameters and a segmented image and producing estimates of object translation, rotation and scaling, the moment transformer comprising:

an object moment computer;

an object pose computer in signal communication with the object moment computer; and

a transformation parameter computer in signal communication with the object pose computer.

25. An object inspection system as defined in Claim 22 wherein the edge detector and interpolator is for receiving an input image, model parameters and estimates and producing a set of line edges, the edge detector and interpolator comprising:

an edge response computer;

a non-maxima data suppressor in signal communication with the edge response computer;

a double-threshold image filter in signal communication with the non-maxima data suppressor;

an edge linker and line splitter in signal communication with the double-threshold image filter; and

an edge point interpolator in signal communication with the edge linker and line splitter.

26. An object inspection system as defined in Claim 22 wherein the iterative optimizer is for receiving an input image, model

parameters, estimates and line edges and producing refined estimates of object translation, rotation and scaling, the iterative optimizer comprising:

an energy function and differential computer;

a Newton updater in signal communication with the energy function and differential computer;

a parameter determination unit in signal communication with the Newton updater; and

a convergence checker in signal communication with the parameter determination unit.

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